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for July 31. In that portion of the report which is devoted to the consideration of the agricultural development of the island, it is stated that the chief agricultural products are sugar, coffee, cocoa, vanilla, cloves, rice, potatoes, tamarinds, indigo, wine, oranges, and lemons. Sugar cultivation was first commenced in 1842; and two factories were erected at Manangary. Good results were obtained in the first two years; but, during the third year, riots took place among the workmen, and the plantations were destroyed. In 1878 three new factories were established in the neighborhood of Tamatave; and in 1883, on the outbreak of hostilities between France and Madagascar, they were in full working. At the present time, the number of plantations round Tamatave has greatly increased; and also in the south, towards Mahanoro and Vatomandry. The expenses of cultivating are greater near Tamatave, by reason of the high price of land and the scarcity of labor, than in the south, towards Vatomandry and Manangary, where labor and land are cheap. Leases are usually granted for twenty-five years, renewable at option. They may even be granted for a period of ninety-nine years.

Coffee trees grow well in Madagascar; and it is stated to be by no means an uncommon thing to see plantations that are forty-five years old, and even more, which have never ceased to yield good results. European travellers, it is said, are frequently struck by the healthy appearance and the quantity of berries in most of the plantations made round the houses or in the villages inhabited by the natives, even when these plantations appear to be abandoned and left to take care of themselves. A large plantation has recently been established in Imerina by a French company; it extends over an area of about 800 acres. Great results are expected from the development of the coffee industry in Madagascar, as the difference between the cost price and the price it realizes in European markets allows of a considerable outlay on its cultivation and then leaves a large margin of profit.

The cocoa tree was introduced into Madagascar by means of seeds brought from the Mauritius and Reunion, in which places it has been for a long time a source of considerable revenue. The tree commences to bear at the end of three years, but it is only in full bearing at the end of the fifth year, and it so remains for thirty years. The cost of cultivation is less than that of coffee. The cocoa tree is chiefly cultivated in the eastern portion of the island, and it is only of recent years that the industry has assumed any importance. In 1883 there were not less than five or six thousand trees round the coast, and these were abandoned when the war broke out. After the war it was found that, notwithstanding the want of care and attention, the young cocoa plantations were still flourishing, and this phenomenon encouraged the planters to pay greater attention to the development of this cultivation. This development dates from the year 1888. Like cocoa, vanilla is one of the agricultural products which has a great future before it in Madagascar, and its cultivation is largely engaged in in Vatomandry, Mahanoro, and Mahela. Vanilla plants commence to yield after the third year, and in the fourth they are in full bearing.

The cultivation of rice, which is well-developed in the interior of the island, is very much less so on the coasts, where the land is more fertile. While in the latter districts the inhabitants are content to sow the seed without any preparation of the ground but the burning of the trees and grass, the Hovas and the Betsileos, having a much poorer soil, take more pains to develop and perfect their system of cultivation. In some instances, for example, in the neighborhood of Antananarivo, they have transformed immense tracts of marsh land into rice plantations. The plains of Betsimitatatra, towards the west of the capital, which are watered by the Ikopa, Andromba, and Sisaony rivers, now the centre of the rice production in Imerina, have been drained and cleared, irrigating canals have been pierced, and everything has been done to favor the production. Similar well cultivated plains are found in great number in the south of Imerina and in Betsileo. In the mountain districts the rice grounds are laid out in terraces on the slopes of the mountains and hills, and rice grounds are frequently met with rising tier upon tier up to the very summit of the high mountains.

The following is the method of cultivation employed by the

Hovas and Betsileos. The rice is first of all sown, then, when it has attained a height of fifteen centimetres, it is plucked up and replanted. The preparation of the ground is an operation to which considerable attention is devoted; it is first of all heavily manured, and when the seed is sown and commences to shoot up, it is subjected alternately to the action of the sun and moisture. In the transplanting, the same system is followed as in other rice-growing countries, care being taken to choose a wet season of the year. The ground must, first of all, have been subjected to various treatments, which would have the effect of transforming it into a kind of mud. In many districts this is effected by trampling over the inundated lands, already softened by driving herds of oxen over them. An improvement in the methods of cultivation practised by the natives of the coast, and of the means of transport, would, it is said, give to this industry its old importance. As regards the future of rice cultivation in the interior, it would never rise beyond the needs of local consumption, as it would be impossible for a low-priced product such as this to bear the heavy expenses of transport by land. Its cultivation, however, would prove remunerative to farmers and others if they would establish factories for the distillation of the alcohol obtained from the rice. At the present time, in the interior of the island, a tenth part of the rice lands only are cultivated, and this suffices for the requirements of home consumption.

Potatoes are largely cultivated in the districts round Ankaratra, and considerable quantities are placed upon the neighboring markets and at Antananarivo, principally for the consumption of the natives. Tamarinds are common all over the west coast, where the plants form immense thickets. The Sakalaves distil spirits from the fruit. Peaches grow almost wild all over the island, and the same may be said of the indigo plant.

As regards vines, there are different species in Madagascar. One variety was originally imported from Portugal; another variety appears to be indigenous to the soil. In Imerina attempts have been made in recent years to acclimatize vines, but some which were brought from Bordeaux have not succeeded. On the other hand, American vines have prospered, but the grapes are not of a superior kind, and the wine made from them is very poor. Orange and lemon trees are found all over the island, growing in a wild state on the coasts, and cultivated in the interior.

As regards textiles, ramie, flax, cotton, and hemp are grown. Plantations of the former were made at Vatomandry, in 1882, which have since increased. The want, however, of decorticating machines has caused this cultivation to be abandoned. Hemp is cultivated in Imerina and Betsileo. Cotton was formerly an important cultivation in Madagascar. The natives gathered it, and themselves manufactured the fabrics, which served them for clothing. Since the importation, however, of American and English cottons, the local industry has been almost killed. M. d'Anthouard says that in view of the fact that cotton grows so easily and quickly in Madagascar, more particularly in the territories bordering on the west coast, where it may be found almost in a wild state, it seems extraordinary that no one, up to the present, has thought of making cotton plantations, either for the export of the raw material, for working it up on the spot, and selling the yarn to the natives, or even for making fabrics which, seeing the heavy expenses of freight and transport which bear upon foreign products, would compete very favorably with similar American goods.

#### IS THE MARINER'S COMPASS A CHINESE INVENTION?

A WRITER in the *North China Herald* of Shanghai devotes a learned article to detailing and discussing the facts regarding the claim of the Chinese to have invented the mariner's compass. They did not learn the properties of the magnetized needle from any other country. They found it out for themselves, though it is impossible to point to the man by name who first observed that a magnetized needle points north and south. He suggests that it came about in this way. The Chinese have in their country boundless tracts of ironstone, and among these no small portion is magnetic. Every woman needs a needle, and iron early took the

place of the old stone needles, and were commonly used before the time of Ch'in Shih-huang—that is, more than twenty-one centuries ago. Whenever a needle happened to be made of magnetic iron, it might reveal its quality by falling into a cup of water, when it happened to be attached to a splinter of wood, for example. It came in some such way to be known commonly that certain needles had this quality. The great producing centre for magnetic iron is T'szhou, in southern Chihli. This city was very early called the City of Mercy, and the magnetic stone produced there came to be known as the stone of T'szhou, and so *t'szhou* became the ordinary name for a magnet. Later, the Chinese began to speak of the city as the "City of the Magnet," instead of calling it the "City of Mercy." The polarity of the magnetic needle would become known to the Chinese of that city and its neighborhood first. The first who noticed the polarity would be some intelligent person who communicated the fact as an unaccountable peculiarity in an age when omens and portents were diligently sought for in every natural object and phenomenon.

The earliest author who mentions the "south-pointing needle" lived in the fourth century B.C. There can be no reasonable doubt that the polarity of the needle was known at that time. The discovery of the fact must have preceded the invention of any myth embracing it. As to the discovery, there is no reason to suppose it was in any way foreign, because the Chinese use an enormous number of needles, and have an inexhaustible supply of ironstone. But though the polarity was known, it was not turned to a practical use till the Tsin dynasty, when landscapes began to be studied by the professors of *fengshui*, or geomancy. There was at that time a general belief in the magical powers of natural objects. This was a Buddhist doctrine, and it took firm hold on the Chinese mind of that age. The Chinese philosophers of those times taught that indications of good and ill luck are to be seen all through nature. The polarity of the needle would take its place in this category of thought. Though it is not distinctly mentioned by writers of the fourth century, yet to their disciples it became an essential part of the landscape compass which the professors of *fengshui* all use. Kwo Pu, the founder of this system, died A.D. 324, and it was not till four centuries later that the *fengshui* compass began to assume its present form.

The compass used by the professors of geomancy for marking landscape indication was first made about the eighth century. It was of hard wood about a foot wide, and it had in the centre a small well in which a magnetized needle floated on water. On the compass were inscribed several concentric circles, as on the wooden horizon of our globes. They embrace the twelve double hours, the ten denary symbols, eight diagrams, and other marks. This compass was used in preparing a geomantic report of any spot where a house or tomb was to be constructed, so that the construction might not be upon an unlucky site or planned in an unlucky manner. At the same time there was living a Chinese who had studied Hindoo astronomy, and was the imperial astronomer, and also a Buddhist priest. He noticed that the needle did not point exactly north, and that there was a variation of  $2^{\circ} 95'$ . This variation went on increasing till a century later, that is, till the ninth century. A professor of geomancy then added a new circle to the compass. On this improved compass the first of the twelve hours begins on the new circle at  $74^{\circ}$  east of north.

The compass, it will be observed, grew out of the old astrological report or nativity paper, calculated from the position of the stars, and prepared in the Han dynasty by astrologers as a regular part of social life, especially when marriages were about to be solemnized. Some of the old astronomical circles are preserved in the new geomantic chart. This was the compass used when Shen-kwa wrote on the south-pointing needle in the eleventh century. This author mentions that any iron needle acquires polarity by rubbing it on a piece of loadstone. He alludes to the variation as a fact which he himself had observed, and speaks of the south-pointing needle as an implement used by the professors of geomancy. By them it was employed in the form of a float upon water. After this, in 1122, an ambassador to Corea describes the use of the floating needle on board ship while he made the voyage. This is the first instance, the earliest by more than a century, of the use of the mariner's compass on board ship,

found as yet in any book, native or foreign. The existence of the book in which this is recorded settles the question of the first use of the mariner's compass at sea in favor of the Chinese. At that time the needle floated on water supported on a piece of wood, but in the Ming dynasty some Japanese junks engaged in piracy were captured by the Chinese, and the compass in use on board was found to have the needle dry and raised on a pivot, while still pointing southward. The Japanese had learned from the Portuguese navigators to make a compass of this kind, and probably the needles they used were brought from Europe. From this time, the Chinese adopted the principle of a pivot, and made their compasses without a well of water in the middle to float the needle in. Charts were probably used of a very rough kind, but how far is not known. What is known is that the junk-master was aware of the direction in which the needle must point to reach the port to which he was going. In the Sung dynasty, embracing part of the tenth, as well as the eleventh, twelfth, and part of the thirteenth centuries, Chinese junks went to Persia and India. The Arabs trading to China directly would learn at that time the use of the compass, and would apply it on board their dhows. From them the Europeans learned this useful invention.

The credit of the discovery, both of the polarity of a magnetized needle and its suitability for use by mariners at sea, must, therefore, according to the writer, be given to the Chinese, says *Nature*, in commenting on the article. It is China also that has the credit of having first noticed that any iron needle may be polarized by rubbing it with a magnet. In the thirteenth century the Arabs used a floating compass on their dhows. The needle was made to float on the water by attaching it crosswise to a cornstick or splinter of wood. A magnet applied to it drew it into a north and south direction. They would use Western notation to mark the quarters and intermediate points on the horizon. When, therefore, the mariner's compass was adopted from them, the Chinese 24 points were not communicated. In the European compass the notation of 32 points is Western, and rests on the winds and the sun. In the Chinese primitive mariner's compass the notation is that of the professors of geomancy, and rests on the old astrological division of the horizon into twelve double hours. From the Arab account we learn, what the Chinese accounts do not tell us, that the Chinese floated the needle by inserting it in a splinter of wood.

#### LETTERS TO THE EDITOR.

*Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

*On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.*

*The editor will be glad to publish any queries consonant with the character of the journal.*

#### Crime among Washington Negroes.

A CONTRIBUTOR to the Washington *Evening Star* of the 5th instant, signing himself "A Friend of the Negro," has recently been making some comparative studies of the records of the Washington police courts, and greatly deplores the showing for crime they exhibit against the rising generation of Washington negroes. He states, and there is every reason to believe that his statement is true, that "the police report for the year ending June 25, 1890, shows as follows: assaults on policemen, 162, by whites 75, by colored 87; assaults on special officers, 25, by whites 9, by colored 16. Last year three policemen were killed by negroes, two when attempting to arrest them; and there is scarcely a year that this does not occur. In the *Star* of Dec. 24, 1888, it was stated that there were then in jail, awaiting trial or sentence for murder, 16 persons, 3 white and 14 colored. In the *Post* of March 26, 1890, it was stated that there were then on the calendar 18 murder trials, and in the *Star* of Dec. 29, 1888, it was stated that there had been in the District during the year 26 murders, the greater portion of which was by negroes. Now, when it is borne in mind that they constitute but one-third of the population, it will be seen that this is a terrible record."

Investigating this matter still further, the *Star* correspondent is enlightened in other directions, for he soon finds out that it is the present generation of negroes that is responsible for the majority